

1. A gas laser device, comprising:

- a chamber for sealingly storing a laser gas therein;
- a discharging electrode for exciting the laser gas through electrical discharging;
- a total reflection mirror for totally reflecting laser light produced by the electrical discharging from said discharging electrode;
- an output window for partially reflecting the laser light and for outputting a portion of the laser light amplified between said total reflection mirror and said output window;
- a blower for circulating the laser gas within said chamber, so that the laser gas passing an electrical discharging region of said discharging electrode is circulated in said chamber and is returned to the electrical discharging region of said discharging electrode; and
- operating means for operating said blower in accordance with a state of the electrical discharging from said discharging electrode, including first means for operating the blower rotation in a stand-by state in which no laser gas is excited by the electrical discharging from said discharging electrode and thus no laser light is emitted whereas the gas laser device is in a condition to output the laser light, and second means for operating the blower rotation in an in-operation state in which the laser gas is excited by the electrical discharging from said discharge electrode and the laser light is being outputted.

2. A gas laser device according to Claim 1, wherein said first means operates rotation of said blower when said gas laser device is in the stand-by state by stopping the blower.

4. A gas laser device according to Claim 2, wherein said blower has a blowing blade rotatably supported within said chamber.

5. A gas laser device according to Claim 1, wherein said laser device comprises a noble gas halide excimer laser.

6. A gas laser device according to Claim 5, wherein said noble gas halide excimer laser comprises an XeCl excimer laser.

7. A gas laser device according to Claim 1, further comprising an exposure apparatus for exposing a substrate to the laser light supplied from said gas laser device.

8. A gas laser device according to Claim 7, wherein said first means operates rotation of said blower when said gas laser device is in the stand-by state by stopping the blower.

10. A gas laser device according to Claim 8, wherein said blower has a blowing blade rotatably supported within said chamber.

11. A gas laser device according to Claim 8, wherein said laser device comprises a noble gas halide excimer laser.

12. A gas laser device according to Claim 11, wherein said noble gas halide excimer laser comprises an XeCl excimer laser.

13. An exposure apparatus, comprising:

a laser light source having (i) a chamber for sealingly storing a laser gas therein, (ii) a discharging electrode for exciting the laser gas through electrical discharging, (iii) a total reflection mirror for totally reflecting laser light produced by the electrical discharging from said discharging electrode, (iv) an output window for partially reflecting the laser light and for outputting a portion of the laser light reflected between said total reflection mirror and said output window, and (v) a blower for circulating the laser gas within said chamber so that the laser gas passing an electrical discharging region of said discharging electrode is circulated in said chamber and is returned to the electrical discharging region of said discharging electrode;

a main assembly for exposing a substrate to the laser light from said laser light source; and

operating means for operating said blower in accordance with a state of electrical discharging of said discharging electrode including first means for operating rotation of the blower in a non-exposure-operating state in which no laser gas is excited by the electrical discharging from said discharging electrode and thus no laser light is emitted whereas the exposure device is in a condition to output the laser light, and second means for operating rotation of the blower in an exposure state in which the laser gas is excited by electrical discharging from said discharging electrode and the laser light is being outputted.

14. An apparatus according to Claim 13, wherein said operating means further

comprises means for increasing a rotation speed of said blower in response to a start of an exposure job in which the exposure operation is performed through said main assembly.

15. An apparatus according to Claim 14, wherein said operating means stops the revolution of said blower before a start of the exposure job.

17. An apparatus according to Claim 15, wherein said blower has a blowing blade rotatably supported within said chamber.

18. An apparatus according to Claim 13, wherein said laser light source comprises a noble gas halide excimer laser.

19. An apparatus according to Claim 18, wherein said noble gas halide excimer laser comprises an XeCl excimer laser.

20. A semiconductor device manufacturing method comprising:
sealingly storing a laser gas in a chamber;
exciting, using a discharging electrode, the laser gas through electrical discharge;
totally reflecting laser light produced by the electrical discharging from said discharging electrode by a total reflection mirror;
partially reflecting the laser light by an output window and outputting a portion of the laser light reflected between said total reflection mirror and said output window;

circulating, using a blower, the laser gas within the chamber, so that the laser gas passing an electrical discharging region of the discharging electrode is circulated in the chamber and is returned to the electrical discharging region of the discharging electrode; and

operating rotation of the blower in accordance with a state of electrical discharging from said discharging electrode including operating rotation of the blower in a stand-by state in which no laser gas is excited by the electrical discharging from said discharging electrode and thus no laser light is emitted whereas the chamber is in a condition to output the laser light, and differently operating rotation of the blower in an in-operation state in which the laser gas is excited by the electrical discharging from said discharge electrode and the laser light is being outputted.

21. A gas laser device according to Claim 1, wherein said laser device comprises an F₂ laser.

22. A gas laser device according to Claim 5, wherein said noble gas halide excimer laser comprises a KrF excimer laser.

23. A gas laser device according to Claim 5, wherein said noble gas halide excimer laser comprises an ArF excimer laser.

24. A gas laser device according to Claim 8, wherein said laser device comprises an F₂ laser.

25. A gas laser device according to Claim 11, wherein said noble gas halide excimer laser comprises a KrF excimer laser.
26. A gas laser device according to Claim 11, wherein said noble gas halide excimer laser comprises an ArF excimer laser.
27. An apparatus according to Claim 13, wherein said laser light source comprises an F₂ laser.
28. An apparatus according to Claim 18, wherein said noble gas halide excimer laser comprises a KrF excimer laser.
29. An apparatus according to Claim 18, wherein said noble gas halide excimer laser comprises an ArF excimer laser.
30. A gas laser device, comprising:
- a chamber for sealingly storing a laser gas therein;
 - a discharging electrode for exciting the laser gas through electrical discharging;
 - a blower for circulating the laser gas within said chamber, so that the laser gas passing an electrical discharging region of said discharging electrode is circulated in said chamber and is returned to the electrical discharging region of said discharging electrode; and
 - operating means for operating said blower in accordance with a state of the

electrical discharging from said discharging electrode, including first means for operating the blower rotation in a stand-by state in which no laser gas is excited by the electrical discharging from said discharging electrode and thus no laser light is emitted whereas the gas laser device is in a condition to output the laser light, and second means for operating the blower rotation in an in-operation state in which the laser gas is excited by the electrical discharging from said discharge electrode and the laser light is being outputted.

31. A gas laser device according to Claim 30, wherein said first means operates rotation of said blower when said gas laser device is in the stand-by state by stopping the blower.

32. A gas laser device according to Claim 31, wherein said blower has a blowing blade rotatably supported within said chamber.

33. A gas laser device according to Claim 30, wherein said laser device comprises a noble gas halide excimer laser.

34. A gas laser device according to Claim 33, wherein said noble gas halide excimer laser comprises an XeCl excimer laser.

35. A gas laser device according to Claim 30, further comprising an exposure apparatus for exposing a substrate to the laser light supplied from said gas laser device.

36. A gas laser device according to Claim 35, wherein said first means operates rotation of said blower when said gas laser device is in the stand-by state by stopping the blower.

37. A gas laser device according to Claim 36, wherein said blower has a blowing blade rotatably supported within said chamber.

38. A gas laser device according to Claim 36, wherein said laser device comprises a noble gas halide excimer laser.

39. A gas laser device according to Claim 38, wherein said noble gas halide excimer laser comprises an XeCl excimer laser.

40. A gas laser device according to Claim 30, wherein said laser device comprises an F₂ laser.

41. A gas laser device according to Claim 33, wherein said noble gas halide excimer laser comprises a KrF excimer laser.

42. A gas laser device according to Claim 33, wherein said noble gas halide excimer laser comprises an ArF excimer laser.

43. A gas laser device according to Claim 36, wherein said laser device comprises an F₂ laser.

44. A gas laser device according to Claim 38, wherein said noble gas halide excimer laser comprises a KrF excimer laser.

45. A gas laser device according to Claim 38, wherein said noble gas halide excimer laser comprises an ArF excimer laser.

46. An exposure apparatus, comprising:

a laser light source having (i) a chamber for sealingly storing a laser gas therein, (ii) a discharging electrode for exciting the laser gas through electrical discharging, and (iii) a blower for circulating the laser gas within said chamber so that the laser gas passing an electrical discharging region of said discharging electrode is circulated in said chamber and is returned to the electrical discharging region of said discharging electrode;

a main assembly for exposing a substrate to the laser light from said laser light source; and

operating means for operating said blower in accordance with a state of electrical discharging of said discharging electrode including first means for operating rotation of the blower in a non-exposure-operating state in which no laser gas is excited by the electrical discharging from said discharging electrode and thus no laser light is emitted whereas the exposure device is in a condition to output the laser light, and second means for operating rotation of the blower in an exposure state in which the laser gas is excited by electrical discharging from said discharging electrode and the laser light is being outputted.

47. An apparatus according to Claim 46, wherein said operating means further comprises means for increasing a rotation speed of said blower in response to a start of an exposure job in which the exposure operation is performed through said main assembly.

48. An apparatus according to Claim 47, wherein said operating means stops the revolution of said blower before a start of the exposure job.

49. An apparatus according to Claim 48, wherein said blower has a blowing blade rotatably supported within said chamber.

50. An apparatus according to Claim 46, wherein said laser light source comprises a noble gas halide excimer laser.

51. An apparatus according to Claim 50, wherein said noble gas halide excimer laser comprises an XeCl excimer laser.

52. An apparatus according to Claim 46, wherein said laser light source comprises an F₂ laser.

53. An apparatus according to Claim 50, wherein said noble gas halide excimer laser comprises a KrF excimer laser.

54. An apparatus according to Claim 50, wherein said noble gas halide excimer laser comprises an ArF excimer laser.

55. A semiconductor device manufacturing method comprising:
sealingly storing a laser gas in a chamber;
exciting, using a discharging electrode, the laser gas through electrical discharge;
circulating, using a blower, the laser gas within the chamber, so that the laser gas passing an electrical discharging region of the discharging electrode is circulated in the chamber and is returned to the electrical discharging region of the discharging electrode; and
operating rotation of the blower in accordance with a state of electrical discharging from said discharging electrode including operating rotation of the blower in a stand-by state in which no laser gas is excited by the electrical discharging from said discharging electrode and thus no laser light is emitted whereas the chamber is in a condition to output the laser light, and differently operating rotation of the blower in an in-operation state in which the laser gas is excited by the electrical discharging from said discharge electrode and the laser light is being outputted.

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- 56. (New) A gas laser device, comprising:
a chamber for storing a laser gas therein;
exciting means for exciting the laser gas through electrical discharging;
a blower for circulating the laser gas, wherein the laser gas passes an exciting region in said chamber; and
operating means for operating said blower in accordance with a state of the exciting region, said operating means including (i) first means for operating rotation of the blower in a stand-by state in which no laser gas is excited and no laser light is outputted,

and (ii) second means for operating the rotation of the blower in an in-operation state in which the laser gas is excited and laser light is outputted.

57. (New) A gas laser device according to Claim 56, wherein said exciting means comprises a discharging electrode.

58. (New) An exposure apparatus, comprising:

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a laser light source having (i) a chamber for storing a laser gas therein, (ii) exciting means for exciting the laser gas through electrical discharging, and (iii) a blower for circulating the laser gas, wherein the laser gas passes an exciting region in said chamber;

a main assembly for exposing a substrate to laser light from said laser light source; and

operating means for operating said blower in accordance with a state of the exciting region, said operating means including (i) first means for operating the rotation of the blower in a stand-by state in which no laser gas is excited and no laser light is outputted, and (ii) second means for operating the rotation of the blower in an in-operation state in which the laser gas is excited and laser light is outputted.

59. (New) A semiconductor device manufacturing method, comprising the steps of:

storing a laser gas in a chamber;

exciting, by use of exciting means, the laser gas through electrical discharging;